

PERSONAL STUDY: CANALS

THE BRIDGEWATER CANAL

Canals were needed for the **Industrial Revolution** which was creating huge amounts of heavy produce which had to be moved. Roads simply could not handle such weights and the vehicles needed to move this produce did not exist. Canals were the answer to moving heavy objects large distances.

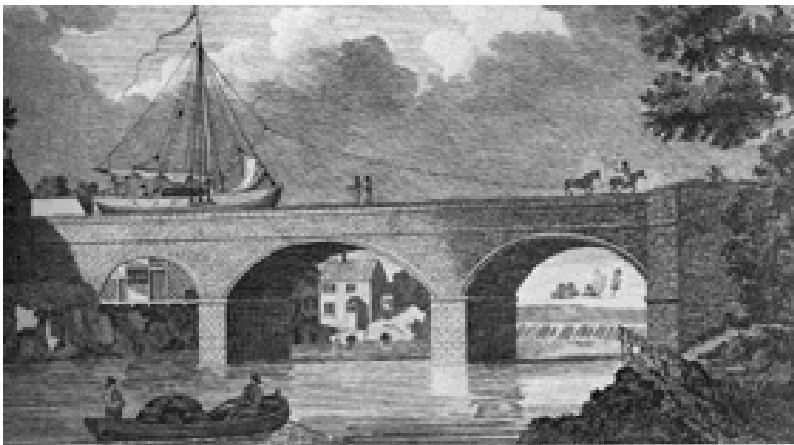
Canals were man-made rivers which were deep enough to cope with barges which were capable of moving nearly forty tonnes of weight. This was far more than a pack of mules could carry or a horse and carriage.

As business grew in the North and Midlands, there was a need for waterways where no rivers flowed. It is a short step from improving a river with cuts and locks to cutting an artificial river or canal. In 1757 the first such canal in England was built – the Sankey Canal. It ran from the St Helen's coalfield to the Mersey River and it was used to supply Liverpool with coal. Two years later work started on a much more important project, the Bridgewater Canal.

The Duke of Bridgewater owned a coal mine at Worsley. He found it very expensive to take coal by packhorse to nearby Manchester, so he planned to build a canal there from his mine. He was helped by two men. One was John Gilbert, the land agent who looked after the Bridgewater estates. The other was James Brindley, who was recommended to the Duke as a very clever engineer, though he had never been to school.

The Duke gave the task of designing and building the canal to **James Brindley** - an engineer who at this time had never built a canal before. As such, the duke was taking a great risk and he even had to borrow £25,000 to pay for the project - which was a vast sum of money then.

It took two years to build the canal which was completed in 1761. The canal had a series of tunnels which were linked directly to the coal mines. But its most famous section was the Barton Aqueduct which took the canal over the River Irwin.



Gilbert and Brindley planned to build the canal all on one level. To do this they had to cross the River Irwell at Barton. This picture shows how they did it. This special bridge is called an aqueduct. It carries the waters of the canal over the river. You can see the barge being pulled across by two horses.

The Bridgewater canal was opened in 1761 and was a great success. The Duke was able to sell coal in

Manchester for half the price he had charged before, and as a result he sold more and more of it.

Canals could make those who invested in them vast sums of money. In the 1790's so-called "canal mania" took place when people invested their money into practically every canal project. Canals were good at moving fragile goods such as pottery and also heavy goods such as coal. They were actually faster than carriages and pack mules as once a horse got a barge moving, its own momentum would keep it going at a decent pace. **By 1840, there were nearly 4,500 miles of canals in Britain. Yet within years their great days were over. Why ?**

- different builders build different size canals so that different size canal barges were needed. One canal barge might not be able to use a canal built by another engineer. This, naturally, limited them a great deal.

- better roads had lead to better horse drawn carriages being developed. These were a lot faster than barges and passengers used these in preference to canals.
- food that rotted quickly could not be transported by canal as refrigerated units had yet to be invented.
- canals could freeze up in winter and a hot summer could literally dry them out if they were not topped up with water on a regular basis.
- trains were soon to take over the role played by the canals.

How Canals Were Built

Keeping a canal filled with water was often very difficult. Wherever possible, the engineer would make streams run into the canal. If there were no streams he would have to build a reservoir at the high point of the canal to supply it. Can you think why canals needed so much water? To stop the water seeping out, the canal was lined with puddle clay. This is a clay which has been kneaded with water until it becomes waterproof.

Where possible, Brindley made his canals follow one level. This made them very twisty but fairly cheap to build. When the canal had to go up or down hill, he used locks. Now do you see why canals needed so much water?



Canal Lock

If the canal had to go up a steep hill several locks were joined together to form a staircase. You can see a famous five rise staircase at Bingley in West Yorkshire. Staircase locks were slow in use and needed vast quantities of water. Some engineers tried to replace them with lifts. The barges were floated in large steel boxes called caissons. The caisson with the barge in it was pulled up rails on wheels to the next level of the canal. Today there is only one lift in use – the Anderton lift near Northwich in Cheshire.

When a canal engineer was faced with a very large hill to pass he would arrange a tunnel through it. James Brindley started the first great canal tunnel – the Harecastle Tunnel on the Trent and Mersey Canal. It was over a mile and half long and took eleven years to build.

Hills were difficult to cross but river valleys were just as bad. Usually engineers did as Brindley had done on the Bridgewater Canal and built an aqueduct. Probably the finest aqueduct is the Pont Cysylte built by Telford. It has massive stone pillars and the water is carried in a cast iron channel. Telford invented this method because a canal in its puddle clay bed would have been too heavy for the pillars. The aqueduct took ten years to build and was opened in 1805. It is over 1,000 feet long and the pillars carry the canal 127 feet above the River Dee.

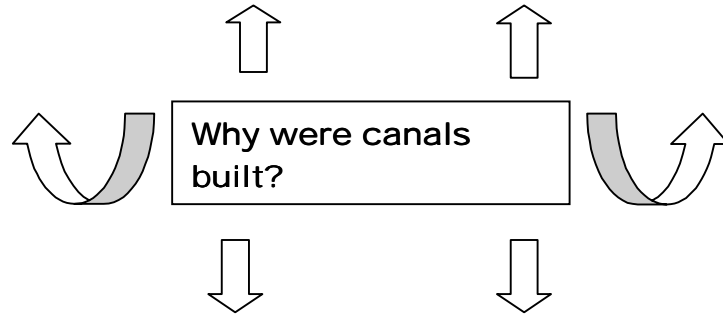


A Navvy

A lot of work was needed to build the canals. Unskilled labourers were employed to dig the canals. Because the early canals were called navigations the workers were called navigators or navvies. Later on, navvies were also used for the building of railways. Because so many were needed navvies had to be brought in from Scotland and Ireland where there were many poor people looking for work.

TASKS: Read the information on these sheets then complete the following tasks.

1. Produce a spider diagram showing why canals were built.



2. Draw a timeline showing the development of canals.
3. List 5 advantages of canals.
4. Explain why the 'great days' of canals were over by 1840.
5. Write a heading in your book: Problems and Solutions of Building a Canal. Then copy and complete the chart below.

PROBLEM	SOLUTION
Finding water for the canal	
Keeping water in the canal	
Getting the canal barges up hills	
Passing very large hills	
Crossing river valleys	
Finding workers to build canals	

6. Were canals the best form of transport? Read the list below. Which three of these do you think provided the strongest arguments for building canals? Explain your choices thoroughly.
 - Canal transport is more regular, you can say what time a barge will arrive but wagons and carts are less reliable.
 - It is better for heavy goods to be moved by water than by horses and wagons.
 - Canals are built where they need to go, and don't wander like rivers.
 - Canals helped trade by providing cheap transport.
 - One horse and barge can move as much as 30 horses on a road.
 - Canals are no more expensive to build than turnpikes and cheaper to maintain.
 - Bad roads make goods scarcer and dearer.